

# Hops Management Schedule

*A guide to weed, insect and  
disease management in hops in  
Nova Scotia*



2019





# GUIDE TO PEST MANAGEMENT IN HOPS

**Nova Scotia Crop Guide to Pest Management 2019**  
[HOP1-19]

**Updated April 23, 2019 by**  
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## **IMPORTANT**

This publication was compiled by representatives from Perennia using information from the Pest Management Regulatory Agency of Health Canada, specific pesticide labels, previous Atlantic Provinces Vegetable Pest Guides and manufacturer's information. **This information is continuously changing and therefore it can cease to be current and accurate. Pesticide labels are the best source of information and should always be consulted prior to using a product.** The label is the best source of information on: registered crop uses, rates, days to harvest, compatibility with other pesticides, toxicity and other special information on its effective and safe use

By printing this publication, Perennia does not offer any warranty or guarantee, nor do they assume any liability for any crop loss, animal loss, health, safety or environmental hazard caused by the use of a pesticide mentioned in this publication.

## **WARNINGS**

**This publication is meant to be used as a reference for possible pest control options.** Where there are multiple brand names of a specific active ingredient registered in Canada, Perennia has only listed a couple for reference purposes and as such does not endorse one brand over another. If you have purchased a generic product not specifically in this guide but has your crop and pest on the label, always follow that product label.

**If any information in this or any other publication conflicts with the information on the label, always use the label recommendation.** If you have an old label, your pesticide supplier should be able to give you the newest label. You are legally responsible for the safe use of pesticides you purchase. This means the safe transport and storage of these materials, the label rates used on crops, and the safe disposal of containers.

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Pest	Group	Active Ingredient	Product Name	Rate	REI*	PHI** (days)	Remarks
<b>WEEDS:</b>							
Pre-emergence <i>Soil applied</i>	29	Indaziflam	<b>Alion/Indaziflam 200 SC</b>	375 ml/ha	12 hours	120	Do not apply prior to any type of soil disturbance. Apply as a directed spray to the soil prior to shoot emergence when the hops are still dormant. Apply a maximum of one application per season, using ground equipment.
			<b>Indaziflam 500 SC</b>	150 ml/ha			
	14	Flumioxazin  <i>NEW 2019</i>	<b>Chateau</b>	280-420 g/ha	12 hrs	30	Do not apply more than 420 g/ha per season. Do not allow spray to contact green stem (unless used for sucker control), foliage, flowers, or cones, or unacceptable injury may occur. Do not use with an adjuvant. Do not apply to fine-textured soils. Use an appropriate water volume to ensure thorough coverage. <b>Pre-emergence weed control:</b> Apply as a 30-45 cm (1-1.5 ft) band to each side of the hop row. Apply to dormant hops in the fall to ensure time for rain incorporation and activation. If weeds are emerged at the time of application, tank mix Chateau with a labeled burndown herbicide, such as carfentrazone-ethyl, to assist with control of emerged weeds. Do not mow or rake over treated areas, as dust created by mowing may drift to sensitive crops or vegetation, resulting in injury. <b>Sucker control:</b> Apply as a directed application after hops have reached a minimum of 1.8m (6 ft) in height for sucker control. Application should be directed to the lower 0.6m (2 ft) of the hops.
Post-emergence	1	Clethodim	<b>Centurion EC</b>  + Amigo 0.5-1% v/v	0.19-0.38 L/ha	12 hrs	21	Apply a maximum of one application per year. Apply as a broadcast spray directed to the ground.

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Grass weeds			Select EC + Amigo 0.5-1% v/v	0.19-0.38 L/ha	12 hrs	21	Apply a maximum of one application per season, using ground equipment. Apply as a broadcast spray directed to the ground. Apply in a minimum spray volume of 110 litres of water per hectare.
	1	Sethoxydim	Poast Ultra + Merge (adjuvant)	1.1 L/ha	12 hrs	180	For post emergence control of annual grasses, wild oats, volunteer cereals and quackgrass. Merge Adjuvant must be applied to all applications of Poast Ultra.
Post-emergence	14	Carfentrazone-ethyl	Aim EC + Agral 90 or Ag-Surf or Merge (adjuvant)	150 mL/ha	12 hrs	7	Extreme caution must be taken during application to avoid upward drift of the spray solution and contact with the highly susceptible new growth. <i>Suggested use of inter-row shields or hooded sprayers to prevent drift.</i> Avoid applications until newly trained vines have developed sufficient barking to avoid damage to the stem and are high enough up the string to avoid contact with the apical bud. <b>Sucker management:</b> Direct application on lower 45 cm of plant and to the sucker mat. Maximum 2 applications per year.

\*REI - Restricted-Entry Interval

\*\*PHI- Pre-harvest Interval

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Pest	Group	Active Ingredient	Pesticide Product Name	Rate	REI*	PHI ** (days)	Remarks	Permitted in some organic systems (Check with certifier)
<b>INSECTS:</b>								
<b>Spider Mites Including Two-Spotted Spider Mites</b>	NS	Potassium salts of fatty acids	<b>Kopa</b>	8L/ha	NS	0	Avoid spraying during full sun. Commence treatment when infestation is first noticed. Thoroughly spray insect pests on plants with diluted product to wetting.	Yes
			<b>Neudosan Commercial</b>	8 L/ha	NS	0	Avoid spraying during full sun. Repeat every 1-2 weeks as needed. Apply to a maximum of 3 consecutive applications to ensure plant injury does not occur. Additional applications may be possible – see label for details.	Yes
			<b>Opal</b>	8 L/ha	NS	0		Yes
	NS		<b>Purespray green spray oil 13E</b>	10 L in 1000 L water/ha	12 hrs	21	Begin applications when conditions are favourable for disease development and/or when 1 <sup>st</sup> symptoms appear. Apply at 10–14 day intervals. <b>Suppression only</b>	Yes
	20D	Bifenazate	<b>Acramite 50 WS</b>	851 g/ha Equivalent to 15 pouches/4 ha	12 hours, except 5 days when stripping and/or training hops	14	<b>Only 1 application per year.</b> Apply in at least 1000 L/ha. Ensure thorough coverage of all leaf surfaces	No

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	6	Abamectin	<b>Agri-Mek® 1.9% EC</b>  <b>+ non-ionic surfactant 0.25% v/v</b>	550-1100 mL/ha for 1.8-2.5 m trellis  1000 mL/ha for trellis beyond 2.5 m	12 hrs	28	<b>DO NOT</b> apply more than 2 applications per year. Allow 21 days between applications.	No
			<b>Agri-Mek SC</b>	½ trellis growth (1.8 – 2.5 m in height): 125 - 250 mL/ha  Beyond ½ trellis growth: DO NOT use less than 225 mL product/ ha in a minimum of 950 L of water/ha.  0.25% v/v non-ionic surfactant				No
	23		Spirodiclofen	<b>Envidor 240 SC</b>				0.75 L/ha
<b>Caterpillars (Hop looper, Cutworms, Armyworm, Cabbage Looper)</b>	11	<i>Bacillus thuringiensis</i> , var. <i>kurstaki</i> strain ABTS-351	<b>Dipel® 2X DF</b>	Hop Looper 275-550 g/ha European corn borer 560-1120 g/ha	NS	0	Apply at first sign of infestation when larvae are small. Repeat if necessary at 3-14 days. Apply in sufficient water to obtain thorough coverage.	Yes

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	11	<i>Bacillus thuringiensis</i> subspecies <i>kurstaki</i> , strain EVB113-19	<b>Bioprotec CAF</b>	Hop Looper 1.4-2.8 L/ha European corn borer 2.8-4.0 L/ha	NS	0	Apply at first signs of infestations when larvae are small. Repeat applications, according to economic threshold, as necessary to maintain control.	Yes
			<b>Bioprotec PLUS</b>	Hop Looper 0.9-1.8 L/ha European corn borer 1.5-2.5 L/ha	NS	0	For European corn borer, up to 3 applications per generation for a max of 6 applications/year. Allow 5-10 days between applications. Monitor for the pest and apply at hatching, before larvae bore into plant tissues. Apply with a high volume sprayer in a min of 300 Lwater/ha.	Yes
	11	<i>Bacillus thuringiensis</i> subsp. <i>aizawai</i> , Strain ABTS-1857	<b>XenTari WG</b>	Hop Looper 0.5 – 1 L/ha	When dried	0	Apply at first sign of infestation when larvae are small. Use enough spray volume to ensure thorough coverage	Yes
	28	<i>Chlorantrani liprole</i>	<b>Coragen</b>	250-375 ml/ha Cutworms, Armyworm  250 ml/ha Cabbage Looper	12 hrs	0	Begin applications when treatment thresholds have been reached. Thorough coverage is important to obtain optimum control. For black cutworm control, apply to foliage when rain is not expected in the next 24 hours. For optimal control, apply to smaller plants or when lower portions of the plant can receive adequate coverage.	No

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<b>Aphids</b>	NS	Mineral oil	<b>Purespray green spray oil 13E</b>	10 L in 1000 L water/ha	12 hrs	21	Begin applications when conditions are favourable for disease development and/or when 1 <sup>st</sup> symptoms appear. Apply at 10 – 14 day intervals. <b>Suppression only</b>	Yes
	NS	Potassium Salts of Fatty Acids	<b>Kopa</b>	8L/ha	NS	0	Commence treatment when infestation is first noticed. Thoroughly spray insect pests on plants with diluted product to wetting.	Yes
			<b>Opal</b>	8 L/ha	NS	0	Repeat every 1-2 weeks as needed. Apply to a max of 3 consecutive applications to ensure plant injury does not occur. Additional applications may be possible – see label for details.	Yes
	NS	Potassium Salts of Fatty Acids ( <i>cont.</i> )	<b>Neudosan Commercial</b>	8 L/ha	NS	0	Avoid spraying during full sun. Repeat every 1-2 weeks as needed. Apply to a max of 3 consecutive applications to ensure plant injury does not occur. Additional applications may be possible – see label for details.	Yes
	4D	Flupyradifurone	<b>Sivanto</b>	0.5 – 0.75 L/ha	12 hrs	21	Minimum application volume: 100 L/ha. Maximum allowed per crop season: 750 mL/ha	No
29	Flonicamid	<b>Beleaf 50 SG</b>	0.12 – 0.16 kg/ha	31 days for stripping and training	31	Thorough spray coverage of plant foliage is essential for optimum control.	No	

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							Minimum 7 days between applications and no more than 3 applications per year	
	23	Spirotetramat	<b>Movento 150 OD</b>	585 – 700 mL/ha	12 hrs	7	Ground application only. Minimum interval between applications: 14 days	No
			<b>Movento 240 SC</b>	365 – 435 mL/ha				No

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Pest	Group	Active Ingredient	Pesticide Product Name	Rate	REI*	PHI ** (days)	Remarks	Permitted in some organic systems
<b>DISEASES:</b>								
<b>Downy Mildew</b>	M	Copper	<b>Copper 53W Wettable Powder</b>	4-5 kg/1000 L	48 hrs		Four applications at weekly intervals. Maximum 4 applications per year	Yes
	4	Metalaxyl-M and S-isomer	<b>Ridomil Gold 480 EC or Ridomil Gold 480 SL</b>	570 mL/ha	12 hrs	135	Only 1 application per year. Apply as a soil drench, do not use as a foliar application	No
	7, 11	Boscalid and Pyraclostrobin	<b>Pristine WG</b>  <b>*Registered for use on powdery mildew as well</b>	0.105 Kg	8 days for hand set irrigation, 46 days for harvesting, and 12 hours for all other activities.	46	Begin applications prior to disease development and continue on a 10-14 day interval. Use the shorter interval and the higher rate when disease pressure is high. Should be alternated with another mode of action fungicide registered for the same pest after each application. Maximum 3 applications per year. <b>Suppression only</b>	No
	21	Cyazofamid	<b>Torrent 400SC</b>  <b>Cyazofamid 400SC</b>	0.15 to 0.2 L/ha	12 hrs	3	For downy mildew control, make applications on a 7-14 day schedule beginning when disease is first seen or when weather and downy mildew disease pressure are expected to initiate a disease epidemic. Use the low rate and long interval for preventative applications or very low disease pressure, increasing the rate and shortening the interval as disease pressure and/or fast crop development increases up to the maximum rate and shortest interval. Use water spray volume of at least 935 L/ha.	No

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							Should be tank-mixed with a non-ionic or organosilicone surfactant (such as Sylgard 309) at the manufacturer's label recommendations.	
40	Dimethomorph	<b>Acrobat 50 WP</b>	450 g/ha	Hand harvesting, training or stripping: 18 days Other activities: 12 hrs	7		Maximum 3 applications per year. Must be applied as a tank mix with another fungicide active against downy mildew. <b>Suppression only</b>	No
40	Mandipropamid	<b>Revus</b>	600 mL/ha + non-ionic Adjuvant (0.25% v/v is recommended)	12 hrs	7		Post-emergent foliar broadcast treatment by ground or air. Prior to disease development and continue throughout the season on a 7-10 day interval. Use the shorter interval under high pressure or when conditions are conducive to disease. Maximum of 3 applications with no more than 2 consecutive applications. No more than 50% of the total number of sprays should be Revus.	No
40	Dimethomorph	<b>Forum</b>	450 mL/ha	Hand harvesting, training or stripping - 18 days. Other activities - 12hrs	7		<b>Suppression of downy mildew.</b> Maximum 3 applications per year and 10 days interval between applications. DO NOT use less than 200 litres of water per hectare. Do not make more than two sequential applications of Forum before alternating to another fungicide with a different mode of action.	No
40, 45	Ametoctradin and Dimethomorph	<b>Zampro</b>	0.8 - 1.0 L/ha	Hand harvesting, training or stripping - 18 days. Other activities - 12hrs	7			No

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	45	Ametoctradin	<b>Initium</b>	1.2 – 1.5 L/ha	12 hrs	7		No
	NS	<i>Bacillus subtilis</i> Strain QST 713	<b>Serenade® Opti™</b>	3.3 kg/ha	NS	0	<b>Partial suppression of downy mildew:</b> Begin application when environmental conditions are conducive to disease development and repeat on 7-10 day intervals. Use the shorter application intervals under conditions of moderate to high disease pressure.	Yes
	P5	<i>Reynoutria sachalinensis</i>	<b>Regalia® Maxx</b>	0.25 – 0.50% v/v (2.50 – 5.00ml/ L or 1.875 – 3.75 litres of product in 750 litres of water)	NS	0	<b>Partial suppression of downy mildew.</b> Apply this product preventatively when environmental conditions are conducive for disease development. Continue sprays at a minimum 7-day interval. Maximum of 8 applications per season.	Yes
<b>Powdery Mildew</b>	NS	Potassium bicarbonate	<b>MilStop</b>	2.8-5.6 kg/ha	4 hrs	0	Maximum 10 applications per year. Begin application at the first sign of disease. Repeat at 7-14 day intervals until conditions are no longer favorable for disease development. <b>Suppression only</b>	Yes
			<b>Sirocco</b>					Yes
	-	Mineral oil 99%	<b>Purespray green</b> spray oil 13E	10 L in 1000 L water/ha	12 hrs	21	Begin applications when conditions are favourable for disease development and/or when 1 <sup>st</sup> symptoms appear. Apply at 10 – 14 day intervals. <b>Suppression only.</b>	Yes
	13	Quinoxifen	<b>Quintec</b>	300 – 500 mL/ha	12 hrs	21	Maximum 2 applications per year and 14 days interval between applications. <b>Suppression only</b>	No

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	U8	Metrafenone	<b>Vivando SC</b>	0.75 – 1.12 L/ha	12 hrs	14	Maximum 2 applications per season. <b>Suppression only</b>	No
	7, 11	Fluopyram Trifloxystrobin	<b>Luna Sensation</b>	300-600 ml/ha	12 hrs	14	Begin fungicide applications preventatively, when conditions are favourable for disease. Continue as needed on a 10-14 day spray interval. Use the low rate when the vines are small and increase the rate as the vines grow. Make applications in sufficient water volume (just to the point of runoff). Thorough coverage is needed for disease control.	No
	-	Canola oil	<b>Vegol Crop Oil</b>	1 part concentrate to 50 parts water (1L concentrate per 50L water) to make a 2% solution	NS	0	<b>Suppression powdery mildew.</b> Initiate sprays when disease first appears. Continue sprays every 7-14 days. The 7 day application interval is recommended under moderate to high disease pressure.	yes
			<b>Doktor Doom Formula 420 Professional Use 3-in-1</b>					Yes
	-	Citric acid, lactic acid  <i>NEW 2019</i>	<b>Lacto-San</b>	8% to 12 v/v or 12-16L in 200-800L of water	4 hrs	0	Begin applications when conditions are conducive to disease development.	
			<b>Tivano</b>					
<b>Root rot</b> <i>Pythium spp.</i> <i>Rhizoctonia spp.</i>	-	<i>Trichoderma harzianum</i> <i>Rifai</i> strain KRL-AG2	<b>RootShield® HC or WP</b>	3-4 kg/ha in 1000 L/ha	-	-	Drench application to potting soil or mix. Apply to the soil surface immediately around the plants. <b>Suppression only</b>	Yes

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<i>Fusarium spp.</i>								
<b>Grey mold</b> <i>Botrytis cinerea</i>	7	Fluopyram	<b>Luna Privilege</b>	500 ml/ha	12 hrs	7	Begin fungicide applications preventatively. Continue as needed on a 14-day interval. Apply maximum of 2 applications per season for Botrytis.	No

\*REI - Restricted-Entry Interval

\*\*PHI- Pre-harvest Interval

NS – not specified on the label

**Use the following web link to search for any pesticide label mentioned in this guide, or any other pesticide registered in Canada:**

<http://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>

## PESTICIDE EMERGENCY CONTACT INFORMATION

<b>Poison Control Centres</b>		
Nova Scotia	800.565.8161 or 902.428.8161	IWK, Halifax, NS
New Brunswick	911	Ask for Poison Information
Prince Edward Island	800.565.8161 or 902.428.8161	IWK, Halifax, NS
Newfoundland	709.722.1110	Dr. Charles A. Janeway Child Health Care Centre, St. John's, NF

<b>Environmental Emergencies (Pesticide Spills)</b>	
Transport Canada Regional Operations Centre (24 hours)	
Nova Scotia	800.565.1633
New Brunswick	800.565.1633
Prince Edward Island	800.565.1633
Newfoundland	800.563.9089

## ABBREVIATIONS & CONVERSIONS

<b>Formulation and Measurement Abbreviations</b>			
FORMULATIONS		MEASUREMENTS	
EC, E	Oil-based emulsifiable concentrate	mL	millilitre
EW	Water-based concentrate	kPa	kilopascal
F	Flowable	kg	kilogram
Sn	Solution	g	gram
		L	litre
		BIU	Billions of International Units
		ppm	parts per million (1000 ppb)
		ppb	parts per billion (1/1000 ppm)

<b>Helpful Conversions<sup>1</sup></b>	
kPa X 0.14 = pounds per square inch (psi)	millilitres X 0.035 = fluid ounces
hectares X 2.47 = acres	litres X 35 = fluid ounces
kilograms X 2.2 = pounds	litres X 0.22 = imperial gallons
kilograms per hectare X 0.89 = pounds per acre	litres per hectare X 14.17 = fluid ounces per acre
kilograms per hectare X 0.40 = kilograms per acre	litres per hectare X 0.40 = litres per acre
	degree-days C X 1.8 = degree-days F

### <sup>1</sup> Pesticide Units of Measurement

It is not recommended to convert label rates to imperial units because there is a high probability of mathematical and rounding errors. Present day pesticides are formulated to be more effective in smaller amounts. Therefore, even small conversion errors can lead to the use of incorrect rates (either too high or too low). Use metric – you will be glad you did!